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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/828,518	04/06/2001	Woo Sik Yoo	M-8608 US	6248

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THEODORE P. LOPEZ  
MACHPERSON KWORK CHEN & HEID LLP  
2402 MICHELSON DRIVE  
SUITE 210  
IRVINE, CA 92612

EXAMINER

LUK, OLIVIA T

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 05/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/828,518

Applicant(s)

YOO, WOO SIK

Examiner

Olivia T Luk

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2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-7, 16 and 23-28 is/are pending in the application.
- 4a) Of the above claim(s) 8-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 16 and 23-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7, 16, and 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carson (4,476,094) in view of Gadgil (5,284,519).

In re claims 1, and 24, Carson discloses introducing vapor-phase chemicals into a reactor with sufficiently supplied energy to cause a reaction in the reactor (col. 3, lines 50-55), exhausting gases from the reactor resulting from the reaction (col. 3, lines 65-68 and col. 4, lines 1-5), separating a non-purified hydrogen gas from the exhausted gases (col. 4, lines 4-10), venting the exhausted gases free of the non-purified hydrogen (col. 4, lines 40-50), purifying the non-purified hydrogen gas to generate a purified H<sub>2</sub> gas (col. 7, lines 34-41 and col. 8, lines 1-6), and introducing the purified H<sub>2</sub> gas into the reactor along with additional vapor-phase chemicals including pure H<sub>2</sub> gas into the reactor with the additional vapor-phase chemicals including pure H<sub>2</sub> gas into the reactor with sufficient supplied energy to cause a second reaction in the reactor (col. 8, lines 15-25), but fails to specify the vapor-phase chemicals are taken from the group consisting of NH<sub>3</sub>, N<sub>2</sub>O, SiF<sub>4</sub>, SiH<sub>4</sub>, TiCl<sub>4</sub>, N<sub>2</sub>, Ar, HCl, and SiCl<sub>4</sub>. Gadgil et al. teach a process for recycling a vapor-phase chemical by introducing gases taken from the group consisting of NH<sub>3</sub>, N<sub>2</sub>O, SiF<sub>4</sub>, SiH<sub>4</sub>, TiCl<sub>4</sub>, N<sub>2</sub>, Ar, HCl, and SiCl<sub>4</sub> (col. 7, line 33).

It would have been obvious for a person of ordinary skill in the art to modify the process of Carson to include any number of these gases in order to deposit the desired film.

In re claim 2, Carson is applied supra but fails to teach the hydrogen recycle process with thin film deposition. Gadgil teaches thin film deposition in a chemical vapor reactor that uses gases that flow in and out discloses depositing a thin film layer on a substrate positioned in the reactor (col. 16, lines 21-42).

In re claims 3, 16, Carson discloses the first gas comprises H<sub>2</sub> (col. 3, line 52).

In re claim 4, Carson discloses the second gas comprises non-purified H<sub>2</sub> (col. 3, line 52).

In re claims 5, and 25, Carson discloses the first gas comprises about 80% to 90% of the quantity of the H<sub>2</sub> introduced in the reactor (col. 3, lines 51-53).

In re claims 6, and 26, Carson is applied supra, but fails to teach the sufficient supplied energy comprises an RF low frequency power energy level of between about 0.318 watts/cm<sup>2</sup> to about 3.18 watts/cm<sup>2</sup>. It would have been obvious to one having ordinary skill in the art at the time the invention was made to supply energy at this level, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In re claims 7, and 27, Carson is applied supra, but fails to teach the reactor comprises a tapered outer shell surrounding a tapered susceptor. Gadgil teaches the tapered susceptor surrounded by a tapered outer shell. It would have been obvious to one

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having ordinary skill in the art at the time the invention was made to use a tapered shape because this shape is inherently stable and offers an important advantage of reduced particulate formation on the deposition surface and thus higher quality of the deposited film (col. 12, lines 10-15).

In re claims 23 and 28, Carson is applied supra, but fails to teach the vapor-phase chemicals comprises gases selected from the group consisting of  $\text{NH}_3$ ,  $\text{N}_2\text{O}$ ,  $\text{SiF}_4$ ,  $\text{SiH}_4$ ,  $\text{TiCl}_4$ ,  $\text{N}_2$ , Ar, HCl, and  $\text{SiCl}_4$ . Gadgil teaches the vapor-phase chemicals comprise of gases selected from the group consisting of  $\text{NH}_3$ ,  $\text{N}_2\text{O}$ ,  $\text{SiF}_4$ ,  $\text{SiH}_4$  (col. 7, line 33). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use any one of these gases since they are well known in the art to be carrier gases in this type of semiconductor manufacturing.

### *Conclusion*

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References not applied are considered state of the art in the area of semiconductor manufacture.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Olivia T Luk whose telephone number is 703-305-3420. The examiner can normally be reached on 7AM to 4PM Mon-Fri.

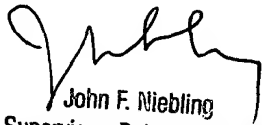
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 703-308-3325. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-746-8802 for regular communications and 703-746-8802 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.

OTL  
May 13, 2003

  
John F. Niebling  
Supervisory Patent Examiner  
Technology Center 2800